

**OBSERVATIONS ON THE NESTS OF *PARANTHIDIUM*
JUGATORIUM PERPICTUM (COCKERELL)
(HYMENOPTERA: MEGACHILIDAE: ANTHIDIINI)**

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Abstract.—Nests of *Paranthidium jugatorium perpictum* (Cockerell) are described from a small aggregation in Larimer County, Colorado. Nests are dug from the ground surface and contain cells in closely packed series, each cell lined with plant gums.

Key Words.—Insecta, Hymenoptera, Megachilidae, *Paranthidium*, nesting behavior

The nests of anthidiine bees are diverse, some being dug in the soil, others built in preexisting holes, still others built of resin, often mixed with pebbles, above ground. All species use materials brought in from outside the nest, including plant resins, pieces of leaves, down, or pebbles [references in Hurd (1979)]. Nests of members of the genus *Paranthidium* have not previously been described. Nests attributed to *P. jugatorium* (Say) were described by Michener (1975). However, voucher specimens in the Snow Entomological Museum, University of Kansas, have shown that these nests were actually those of *Dianthidium curvatum* (Smith) (Linsley et al. 1980).

A nesting aggregation of *P. jugatorium perpictum* (Cockerell) was found 22 Aug 1991, on a south-facing, 20 degree slope above a gulley, 22 km west of Livermore, Larimer County, Colorado, at an elevation of about 2130 m. The slope was covered with clumps of grasses and with scattered sage [*Artemisia frigida* Willd.], sunflowers [*Helianthus pumilus* Nutt.], and bitterbrush [*Purshia tridentata* (Pursh) DC.]. The soil was a powdery sandy-loam containing many stones and plant roots. In 1991, 16 nests were found, all within an area about 2 × 3 m, each nest in a bare spot, often close to the base of a clump of grass. Each nest had an open entrance, 4 mm in diameter, with a small tumulus, about 4 × 6 cm and 1 cm deep, down-slope of the hole. Some nests were separated by no more than 10 cm, but most were more widely spaced. Pollen-laden females were seen descending to the nests and plunging in without pause.

In 1992, 12 nests were noted at this same site beginning 25 Jul. On this date, several females were digging, backing out of their holes every 30 to 90 sec, pushing soil behind them with their legs, the hind legs working in a side-to-side manner. Over the next few days pollen-laden females were collected from flowers of gumweed [*Grindelia squarrosa* (Pursh) Dunal] and rough sunflower [*Helianthus pumilus*], and a female not bearing pollen was taken on golden aster [*Heterotheca villosa* (Pursh) Shinnery]. Males were collected on flowers of these same three plants and also on *Helianthus annuus* L. All of these yellow-blossomed composites grew in abundance within 30 m of the nesting site. No males were seen in the nesting area and no matings were observed.

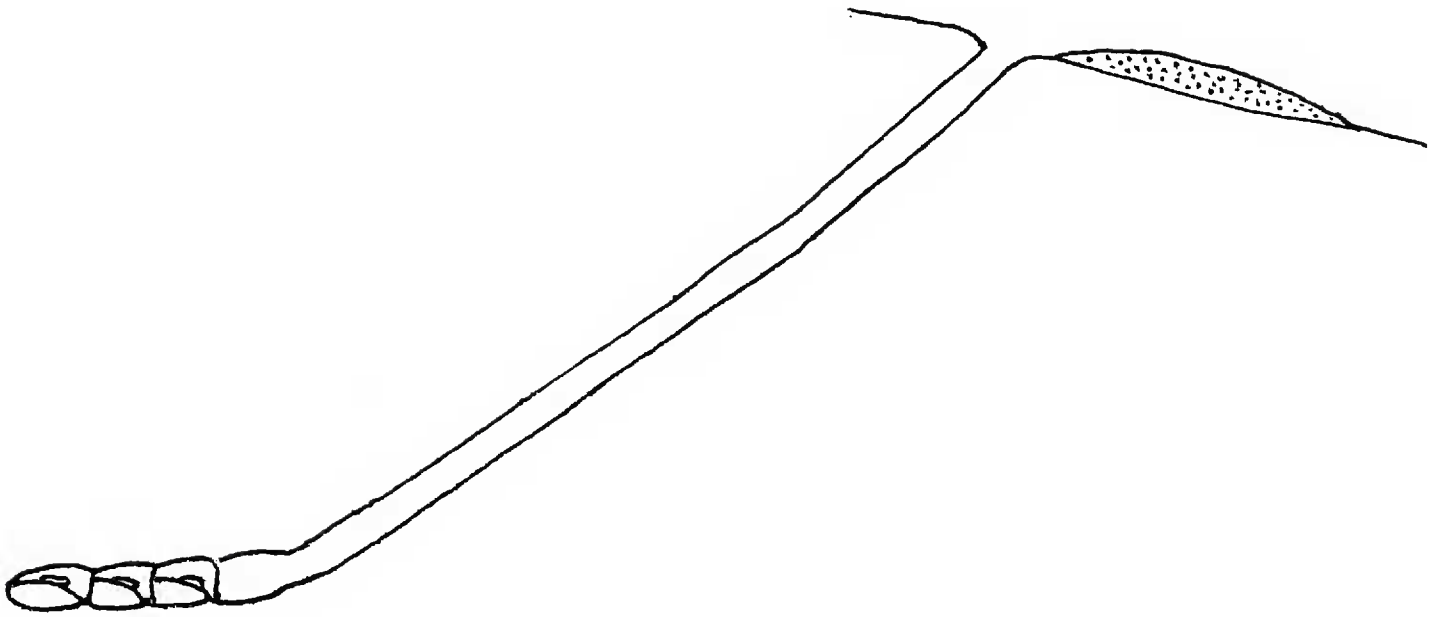


Figure 1. Diagram of a four-celled nest of *Paranthidium jugatorium perpictum*. In this nest the outermost cell has been lined with plant resins but not yet provisioned or closed off. The other three cells each contain a pollen mass on which an egg has been laid.

Three nests were excavated in 1991 and two in 1992. The 25 cells found in these five nests varied in vertical depth from 8 to 11 cm and were from 12 to 21 cm from the nest entrances. Cells were in closely packed series and measured about 7 mm in diameter and 9 to 10 mm long. One nest had two cells in close series when excavated, two others had four, another five cells in two branches of the burrow. The fifth nest had 10 cells in three branches that appeared to diverge from the bottom of the burrow; it is possible that some of these cells belonged to a closely adjacent nest.

Cell walls had a very thin lining (ca. 0.5 mm) of a sticky, translucent substance that was semifluid in fresh cells but became stiffer and plastic-like in cells containing cocoons. Partitions between cells were built of the same substance and were similarly very thin. Each fresh cell was partially filled with a yellow, semisolid, globular mass of pollen, with an egg about 3 mm long laid longitudinally on its top. Older cells contained larvae or cocoons, the latter brown, parchment-like, each with a short, tubular projection, as common in Anthidiini (illustrated in Stephen et al. 1969: fig. 318; Michener 1975: fig. 3). Cells were always immediately adjacent. The substance used for partitions and cell linings had a consistency very similar to that found on the buds and beneath the corollas of gumweed, and it seems probable that the females gather this substance and use it in their nests. However, this could not be confirmed.

Many cells from previous years were discovered during nest excavations, all 7 to 12 cm deep, indicating that this site had been used for several years previously. Some of the cells contained workers and cocoons of ants, *Lasius alienus* Foerster, which evidently found the cavities useful as nests. A female mutillid, *Dasymutilla vestita* Lepeletier, was seen walking about the nesting area, but was not seen to enter burrows. This mutillid has been found to parasitize bees of several genera, including other Megachilidae.

DISCUSSION

Many bees dig their own nests in the soil, but the burrows are most commonly vertical, resulting in a more or less circular tumulus, with the hole in the center. In contrast, *P. jugatorium perpictum* females make a short, oblique burrow into a slope, leaving a tumulus downslope from the hole. Similar burrows, dug by the female, are unusual but not unknown in the Anthidiini. *Trachusa* (*Trachusomimus*) *perdita* Cockerell was found by Michener (1941) to nest in a group on a hillside in Monterey County, California. Burrows were slanted into the hillside and were only 12 to 15 cm long, with the cells in series, firmly glued together, separated by thin partitions. In this instance the cells were lined with bits of leaves cemented together with a gum that was sticky when fresh but later became hard. *Trachusa* (*Heteranthidium*) *larreae* (Cockerell) was studied by MacSwain (1946) in southern New Mexico. Several dozen nests were found to have been dug by females, the burrows slanting and only 10 to 16 cm long. In this case, the end of the burrow dipped downward 2 to 4 cm and entered a cavity from which the cells radiated. Cells were lined with a resinous material into which particles from the surrounding soil were incorporated. Grigarick & Stange (1968) mention observations of R. W. Thorp on the nests of *Trachusa* (*Trachusomimus*) *gummifera* Thorp and provide a photograph of a three-branched burrow. The nests of this species are basically similar to those of *T. (T.) perdita*. A photograph of a two-branched burrow of the latter species is also provided by these authors, as well as an opened earth-resin brood cell of *T. (Heteranthidium) larreae*.

Cells of *Paranthidium jugatorium perpictum* differed in being lined with pure plant gums, with no inclusion of soil or leaves, although soil particles often adhered to the outside of the cell linings. However, because other Anthidiini nest in preexisting cavities or make free nests above ground, the resemblances between the nests of the known members of these three groups are more striking than the differences.

ACKNOWLEDGMENT

I thank Charles D. Michener and Terry L. Griswold for reviewing an earlier draft of this paper and making helpful suggestions; T. Griswold also identified the bees. Voucher specimens have been placed in the collections of Colorado State University.

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Received 22 October 1992; accepted 19 May 1993.